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use any locomotive engine propelled by steam power in moving interstate or foreign traffic unless the boiler of said locomotive and appurtenances thereof are in proper condition and safe to operate in the service to which the same is put, that the same may be employed in the active service of such carrier in moving traffic without unnecessary peril to life or limb, and all boilers shall be inspected from time to time in accordance with the provisions of this act, and be able to withstand such test or tests as may be prescribed in the rules and regulations hereinafter provided for.

Boilers to be inspected and tested.

SEC. 3. That there shall be appointed by the President, by and with the advice and consent of the Senate, a chief inspector and two assistant chief inspectors of locomotive boilers, who shall have general superintendence of the inspectors hereinafter provided for, direct them in the duties hereby imposed upon them, and see that the requirements of this act and the rules, regulations, and instructions made or given hereunder are observed by common carriers subject hereto. The said chief inspector and his two assistants shall be selected with reference to their practical knowledge of the construction and repairing of boilers, and to their fitness and ability to systematize and carry into effect the provisions hereof relating to the inspection and maintenance of locomotive boilers. The chief inspector shall receive a salary of four thousand dollars per year and the assistant chief inspectors shall each receive a salary of three thousand dollars per year; and each of the three shall

Chief inspector and assistants, how appointed.
Duties and powers of.

Qualifications of.

Salaries and allowances of.

be paid his traveling expenses incurred in the performance of his duties. The office of the chief inspector shall be in Washington, District of Columbia, and the Interstate Commerce Commission shall provide such stenographic and clerical help as the business of the offices of the chief inspector and his said assistants may require.

SEC. 4. That immediately after his appointment and qualification the chief inspector shall divide the territory comprising the several States, the Territories of New Mexico and Arizona, and the District of Columbia into fifty locomotive boiler inspection districts, so arranged that the service of the inspector appointed for each district shall be most effective, and so that the work required of each inspector shall be substantially the same. Thereupon there shall be appointed by the Interstate Commerce Commission fifty inspectors of locomotive boilers. Said inspectors shall be in the classified service and shall be appointed after competitive examination according to the law and the rules of the Civil Service Commission governing the classified service. The chief inspector shall assign one inspector so appointed to each of the districts hereinbefore named. Each inspector shall receive a salary of one thousand eight hundred dollars per year and his traveling expenses while engaged in the performance of his duty. He shall receive in addition thereto an annual allowance for office rent, stationery, and clerical assistance, to be fixed by the Interstate Commerce Commission, but not to exceed in the case of any district inspector six

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hundred dollars per year. In order to obtain the most competent inspectors possible, it shall be the duty of the chief inspector to prepare a list of questions to be propounded to applicants with respect to construction, repair, operation, testing, and inspection of locomotive boilers, and their practical experience in such work, which list, being approved by the Interstate Commerce Commission, shall be used by the Civil Service Commission as a part of its examination.

No person interested, either directly or indirectly, in any patented article required to be used on any locomotive under supervision or who is intemperate in his habits shall be eligible to hold the office of either chief inspector or assistant or district inspector.

SEC. 5. That each carrier subject to this act shall file its rules and instructions for the inspection of locomotive boilers with the chief inspector within three months after the approval of this act, and after hearing and approval by the Interstate Commerce Commission, such rules and instructions, with such modifications as the commission requires, shall become obligatory upon such carrier: *Provided, however,* That if any carrier subject to this act shall fail to file its rules and instructions the chief inspector shall prepare rules and instructions not inconsistent herewith for the inspection of locomotive boilers, to be observed by such carrier; which rules and instructions, being approved by the Interstate Commerce Commission, and a copy thereof being served upon the president, general manager, or general superintendent of such carrier, shall be obligatory,

and a violation thereof punished as hereinafter provided: *Provided also*, That such common carrier may from time to time change the rules and regulations herein provided for, but such change shall not take effect and the new rules and regulations be in force until the same shall have been filed with and approved by the Interstate Commerce Commission. The chief inspector shall also make all needful rules, regulations, and instructions not inconsistent herewith for the conduct of his office and for the government of the district inspectors: *Provided, however*, That all such rules and instructions shall be approved by the Interstate Commerce Commission before they take effect.

SEC. 6. That it shall be the duty of each inspector to become familiar, so far as practicable, with the condition of each locomotive boiler ordinarily housed or repaired in his district; and if any locomotive is ordinarily housed or repaired in two or more districts, then the chief inspector or an assistant shall make such division between inspectors as will avoid the necessity for duplication of work. Each inspector shall make such personal inspection of the locomotive boilers under his care from time to time as may be necessary to fully carry out the provisions of this act, and as may be consistent with his other duties, but he shall not be required to make such inspections at stated times or at regular intervals. His first duty shall be to see that the carriers make inspections in accordance with the rules and regulations established or approved by the Interstate Commerce Commission, and that carriers

Inspectors to become familiar with condition of locomotives.

Personal inspections.

First duty of inspectors.

Carriers to file reports.

Ordering locomotives from service.

Appeal to chief inspector.

Action on appeal.

repair the defects which such inspections disclose before the boiler or boilers or appurtenances pertaining thereto are again put in service. To this end each carrier subject to this act shall file with the inspector in charge, under the oath of the proper officer or employee, a duplicate of the report of each inspection required by such rules and regulations, and shall also file with such inspector, under the oath of the proper officer or employee, a report showing the repair of the defects disclosed by the inspection. The rules and regulations hereinbefore provided for shall prescribe the time at which such reports shall be made. Whenever any district inspector shall, in the performance of his duty, find any locomotive boiler or apparatus pertaining thereto not conforming to the requirements of the law or the rules and regulations established and approved as hereinbefore stated, he shall notify the carrier in writing that the locomotive is not in serviceable condition, and thereafter such boiler shall not be used until in serviceable condition: *Provided*, That a carrier, when notified by an inspector in writing that a locomotive boiler is not in serviceable condition, because of defects set out and described in said notice, may within five days after receiving said notice appeal to the chief inspector by telegraph or by letter to have said boiler reexamined, and upon receipt of the appeal from the inspector's decision, the chief inspector shall assign one of the assistant chief inspectors or any district inspector other than the one from whose decision the appeal is taken to

reexamine and inspect said boiler within fifteen days from date of notice. If upon such reexamination the boiler is found in serviceable condition, the chief inspector shall immediately notify the carrier in writing, whereupon such boiler may be put into service without further delay; but if the reexamination of said boiler sustains the decision of the district inspector, the chief inspector shall at once notify the carrier owning or operating such locomotive that the appeal from the decision of the inspector is dismissed, and upon the receipt of such notice the carrier may, within thirty days, appeal to the Interstate Commerce Commission, and upon such appeal, and after hearing, said Commission shall have power to revise, modify, or set aside such action of the chief inspector and declare that said locomotive is in serviceable condition and authorize the same to be operated: *Provided further*, That pending either appeal the requirements of the inspector shall be effective.

Appeal to
Commission.

Order effective pending appeal.

SEC. 7. That the chief inspector shall make an annual report to the Interstate Commerce Commission of the work done during the year, and shall make such recommendations for the betterment of the service as he may desire.

Annual report of chief inspector.

SEC. 8. That in the case of accident resulting from failure from any cause of a locomotive boiler or its appurtenances, resulting in serious injury or death to one or more persons, a statement forthwith must be made in writing of the fact of such accident, by the carrier owning or operating said locomotive,

Accidents reported by carriers.

- Investigation of accidents.** to the chief inspector. Whereupon the facts concerning such accident shall be investigated by the chief inspector or one of his assistants, or such inspector as the chief inspector may designate for that purpose. And
- Locomotive or parts to be held.** where the locomotive is disabled to the extent that it can not be run by its own steam, the part or parts affected by the said accident shall be preserved by said carrier intact, so far as possible without hindrance or interference to traffic, until after said inspection. The chief inspector or an assistant or the designated inspector making the investigation shall examine or cause to be examined thoroughly the boiler or part affected, making full and detailed report of the cause of the accident to the chief inspector.
- Report of investigation.**
- Special reports to Commission.** The Interstate Commerce Commission may at any time call upon the chief inspector for a report of any accident embraced in this section, and upon the receipt of said report, if it deems it to the public interest, make reports of such investigations, stating the cause of accident, together with such recommendations as it deems proper. Such reports shall be made public in such manner as the Commission deems proper. Neither
- Accident reports inadmissible as evidence.** said report nor any report of said investigation nor any part thereof shall be admitted as evidence or used for any purpose in any suit or action for damages growing out of any matter mentioned in said report or investigation.
- Penalty for violations.** SEC. 9. That any common carrier violating this act or any rule or regulation made under its provisions or any lawful order of any inspector shall be liable to a penalty of one

hundred dollars for each and every such violation, to be recovered in a suit or suits to be brought by the United States attorney in the district court of the United States having jurisdiction in the locality where such violation shall have been committed; and it shall be the duty of such attorneys, subject to the direction of the Attorney General, to bring such suits upon duly verified information being lodged with them, respectively, of such violations having occurred; and it shall be the duty of the chief inspector of locomotive boilers to give information to the proper United States attorney of all violations of this act coming to his knowledge.

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Chief inspec-
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lations.

SEC. 10. That the total amounts directly appropriated to carry out the provisions of this act shall not exceed for any one fiscal year the sum of three hundred thousand dollars.

Appropriations.

Approved, February 17, 1911.

[PUBLIC—No. 318—63D CONGRESS.]

[H. R. 17894.]

AN ACT To amend an Act entitled "An Act to promote the safety of employees and travelers upon railroads by compelling common carriers engaged in interstate commerce to equip their locomotives with safe and suitable boilers and appurtenances thereto," approved February seventeenth, nineteen hundred and eleven.

Act to apply
to entire loco-
motive and ten-
der.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section two of the Act entitled "An Act to promote the safety of employees and travelers upon railroads by compelling common carriers engaged in interstate commerce to equip their locomotives with safe and suitable boilers and appurtenances thereto," approved February seventeenth, nineteen hundred and eleven, shall apply to and include the entire locomotive and tender and all parts and appurtenances thereof.

Powers and
duties of inspec-
tor.

SEC. 2. That the chief inspector and the two assistant chief inspectors, together with all the district inspectors, appointed under the Act of February seventeenth, nineteen hundred and eleven, shall inspect and shall have the same powers and duties with respect to all the parts and appurtenances of the locomotive and tender that they now have with respect to the boiler of a locomotive and the appurtenances thereof, and the said Act of February seventeenth, nineteen hundred and eleven, shall apply to and include the entire locomotive and tender and

all their parts with the same force and effect as it now applies to locomotive boilers and their appurtenances. That upon the passage of this Act all inspectors and applicants for the position of inspector shall be examined touching their qualifications and fitness with respect to the additional duties imposed by this Act. Inspectors and applicants to be examined.

SEC. 3. That nothing in this Act shall be held to alter, amend, change, repeal, or modify any other Act of Congress than the said Act of February seventeenth, nineteen hundred and eleven, to which reference is herein specifically made, or any order of the Interstate Commerce Commission promulgated under the safety appliance Act of March second, eighteen hundred and ninety-three, and supplemental Acts. Not to change other Acts.

SEC. 4. That this Act shall take effect six months after its passage, except as otherwise herein provided. Effective date.

Approved, March 4, 1915.

ORDER.

At a General Session of the INTERSTATE COMMERCE COMMISSION, held at its office in Washington, D. C., on the 2d day of June, A. D. 1911.

Present:

JUDSON C. CLEMENTS,	} Commissioners.
CHARLES A. PROUTY,	
FRANKLIN K. LANE,	
EDGAR E. CLARK,	
JAMES S. HARLAN,	
CHARLES C. McCHORD,	
BALTHASAR H. MEYER,	

IN THE MATTER OF THE PREPARATION, APPROVAL, AND ESTABLISHMENT OF RULES AND INSTRUCTIONS FOR THE INSPECTION AND TESTING OF LOCOMOTIVE BOILERS AND THEIR APPURTENANCES.

Whereas the fifth section of the act of Congress approved February 17, 1911, entitled "An act to promote the safety of employees and travelers upon railroads by compelling common carriers engaged in interstate commerce to equip their locomotives with safe and suitable boilers and appurtenances thereto," provides, among other things, "that each carrier subject to this act shall file its rules and instructions for the inspection of locomotive boilers with the chief inspector within three months after the approval of this act, and after hearing and approval by the Interstate Commerce Commission, such rules and instructions, with such modifications as the Commission requires, shall become obligatory upon such carrier: *Provided, however,*

That if any carrier subject to this act shall fail to file its rules and instructions the chief inspector shall prepare rules and instructions not inconsistent herewith for the inspection of locomotive boilers, to be observed by such carrier; which rules and instructions being approved by the Interstate Commerce Commission, and a copy thereof being served on the president, general manager, or general superintendent of such carrier, shall be obligatory and a violation thereof punished as hereinafter provided;" and

Whereas at the expiration of the period of three months after the approval of said act many of the common carriers subject to the provisions thereof had failed to file their rules and instructions for the inspection of locomotive boilers with the chief inspector; and

Whereas the chief inspector thereupon proceeded to prepare for submission to the Interstate Commerce Commission for its approval rules and instructions for the inspection and testing of locomotive boilers and their appurtenances for such carriers so failing to file the same; and

Whereas upon due notice there came on a hearing before the Interstate Commerce Commission in the matter of the approval and establishment of the rules and instructions prepared by the said chief inspector, on the 29th day of May, 1911; and

Whereas such carriers as had filed their rules and instructions for the inspection and testing of locomotive boilers and their appurtenances with the chief inspector within three months after the passage of said act asked, through their representatives at said hearing, that such of said rules and instructions which did not fulfill the requirements of the proposed rules and instructions prepared by the chief inspector be modified to the extent necessary to conform thereto, and that such of said rules and instructions as prescribed a higher standard than that required by the rules and instructions prepared by the chief inspector be regarded as withdrawn from consideration, and joined in a request that such rules and regula-

tions as had been prepared by the chief inspector and approved by the Interstate Commerce Commission be established with uniformity for them and all other carriers subject to the act; and

Whereas at the hearing aforesaid the rules and instructions prepared by the chief inspector were submitted to the Commission for its approval and all parties appearing at said hearing were fully heard in respect to the matters involved, and said proposed rules and instructions having been fully considered by the Commission:

It is ordered, That said rules and instructions for the inspection and testing of locomotive boilers and their appurtenances, as follows, be, and the same are hereby, approved, and from and after the 1st day of July, 1911, shall be observed by each and every common carrier subject to the provisions of the act of Congress aforesaid as the minimum requirements: *Provided*, That nothing herein contained shall be construed as prohibiting any carrier from enforcing additional rules and instructions not inconsistent with the foregoing, tending to a greater degree of precaution against accidents.

INTERSTATE COMMERCE COMMISSION.

DIVISION OF LOCOMOTIVE INSPECTION.

RULES AND INSTRUCTIONS FOR INSPECTION AND TESTING OF LOCOMOTIVE BOILERS AND THEIR APPURTENANCES.

Approved by orders of the Interstate Commerce Commission, dated
June 2, 1911, September 12, 1912, and June 9, 1914.

RESPONSIBILITY FOR THE GENERAL CONSTRUCTION AND SAFE WORKING PRESSURE.

1. The railroad company will be held responsible for the general design and construction of the locomotive boilers under its control. The safe working pressure for each locomotive boiler shall be fixed by the chief mechanical officer of the company or by a competent mechanical engineer under his supervision, after full consideration has been given to the general design, workmanship, age, and condition of the boiler, and shall be determined from the minimum thickness of the shell plates, the lowest tensile strength of the plates, the efficiency of the longitudinal joint, the inside diameter of the course, and the lowest factor of safety allowed.

FACTOR OF SAFETY.

2. (a) The lowest factor of safety to be used for locomotive boilers constructed after January 1, 1912, shall be 4.

(b) The lowest factor of safety to be used for locomotive boilers which were in service or under construction prior to January 1, 1912, shall be as follows:

(c) Effective January 1, 1915, the lowest factor shall be 3, except that upon application this period may be extended

not to exceed one year, if an investigation shows that conditions warrant it.

Effective January 1, 1916, the lowest factor shall be 3.25.

Effective January 1, 1917, the lowest factor shall be 3.5.

Effective January 1, 1919, the lowest factor shall be 3.75.

Effective January 1, 1921, the lowest factor shall be 4.

3. (a) *Maximum allowable stress on stays and braces.*—For locomotives constructed after January 1, 1915, the maximum allowable stress per square inch of net cross sectional area on fire box and combustion chamber stays shall be 7,500 pounds. The maximum allowable stress per square inch of net cross sectional area on round, rectangular, or gusset braces shall be 9,000 pounds.

(b) For locomotives constructed prior to January 1, 1915, the maximum allowable stress on stays and braces shall meet the requirements of rule No. 2, except that when a new fire box and wrapper sheet are applied to such locomotives they shall be made to meet the requirements of rule No. 3.

TENSILE STRENGTH OF MATERIAL.

4. When the tensile strength of steel or wrought iron shell plates is not known, it shall be taken at 50,000 pounds for steel and 45,000 pounds for wrought iron.

SHEARING STRENGTH OF RIVETS.

5. The maximum shearing strength of rivets per square inch of cross sectional area shall be taken as follows:

	Pounds.
Iron rivets in single shear.....	38,000
Iron rivets in double shear.....	76,000
Steel rivets in single shear.....	44,000
Steel rivets in double shear.....	88,000

6. A higher shearing strength may be used for rivets when it can be shown by test that the rivet material used is of such quality as to justify a higher allowable shearing strength.

RULES FOR INSPECTION.

7. The mechanical officer in charge at each point where boiler work is done will be held responsible for the inspection and repair of all locomotive boilers and their appurtenances under his jurisdiction. He must know that all defects disclosed by any inspection are properly repaired before the locomotive is returned to service.

8. The term "inspector" as used in these rules and instructions, unless otherwise specified, will be held to mean the railroad company's inspector.

INSPECTION OF INTERIOR OF BOILER.

9. *Time of inspection.*—The interior of every boiler shall be thoroughly inspected before the boiler is put into service and whenever a sufficient number of flues are removed to allow examination.

10. *Flues to be removed.*—All flues of boilers in service, except as otherwise provided, shall be removed at least once every three years, and a thorough examination shall be made of the entire interior of the boiler. After flues are taken out the inside of the boiler must have the scale removed and be thoroughly cleaned. This period for the removal of flues may be extended upon application if an investigation shows that conditions warrant it.

11. *Method of inspection.*—The entire interior of the boiler must then be examined for cracks, pitting, grooving, or indications of overheating and for damage where mud has collected or heavy scale formed. The edges of plates, all laps, seams, and points where cracks and defects are likely to develop or which an exterior examination may have indicated, must be given an especially minute examination. It must be seen that braces and stays are taut, that pins are properly secured in place, and that each is in condition to support its proportion of the load.

12. *Repairs.*—Any boiler developing cracks in the barrel shall be taken out of service at once, thoroughly repaired,

and reported to be in satisfactory condition before it is returned to service.

13. *Lap joint seams.*—Every boiler having lap joint longitudinal seams without reinforcing plates shall be examined with special care to detect grooving or cracks at the edges of the seams.

14. *Fusible plugs.*—If boilers are equipped with fusible plugs they shall be removed and cleaned of scale at least once every month. Their removal must be noted on the report of inspection.

INSPECTION OF EXTERIOR OF BOILER.

15. *Time of inspection.*—The exterior of every boiler shall be thoroughly inspected before the boiler is put into service and whenever the jacket and the lagging are removed.

16. *Lagging to be removed.*—The jacket and lagging shall be removed at least once every five years and a thorough inspection made of the entire exterior of the boiler. The jacket and lagging shall also be removed whenever, on account of indications of leaks, the United States inspector or the railroad company's inspector considers it desirable or necessary.

TESTING BOILERS.

17. *Time of testing.*—Every boiler, before being put into service and at least once every 12 months thereafter, shall be subjected to hydrostatic pressure 25 per cent above the working steam pressure.

18. *Removal of dome cap.*—The dome cap and throttle standpipe must be removed at the time of making the hydrostatic test and the interior surface and connections of the boiler examined as thoroughly as conditions will permit. In case the boiler can be entered and thoroughly inspected without removing the throttle standpipe the inspector may make the inspection by removing the dome cap only, but the variation from the rule must be noted in the report of inspection.

19. *Witness of test.*—When the test is being made by the railroad company's inspector, an authorized representative of the company, thoroughly familiar with boiler construction, must personally witness the test and thoroughly examine the boiler while under hydrostatic pressure.

20. *Repairs and steam test.*—When all necessary repairs have been completed, the boiler shall be fired up and the steam pressure raised to not less than the allowed working pressure, and the boiler and appurtenances carefully examined. All cocks, valves, seams, bolts, and rivets must be tight under this pressure and all defects disclosed must be repaired.

STAYBOLT TESTING.

21. *Time of testing rigid bolts.*—All staybolts shall be tested at least once each month. Staybolts shall also be tested immediately after every hydrostatic test.

22. *Method of testing rigid bolts.*—The inspector must tap each bolt and determine the broken bolts from the sound or the vibration of the sheet. If staybolt tests are made when the boiler is filled with water, there must be not less than 50 pounds pressure on the boiler. Should the boiler not be under pressure, the test may be made after draining all water from the boiler, in which case the vibration of the sheet will indicate any unsoundness. The latter test is preferable.

23. *Method of testing flexible staybolts with caps.*—All flexible staybolts having caps over the outer ends shall have the caps removed at least once every 18 months and also whenever the United States inspector or the railroad company's inspector considers the removal desirable in order to thoroughly inspect the staybolts. The firebox sheets should be examined carefully at least once a month to detect any bulging or indications of broken staybolts.

24. *Method of testing flexible staybolts without caps.*—Flexible staybolts which do not have caps shall be tested once each month the same as rigid bolts.

Each time a hydrostatic test is applied such staybolt test shall be made while the boiler is under hydrostatic pressure not less than the allowed working pressure, and proper notation of such test made on Form No. 3.

25. *Broken staybolts*.—No boiler shall be allowed to remain in service when there are two adjacent staybolts broken or plugged in any part of the firebox or combustion chamber, nor when three or more are broken or plugged in a circle 4 feet in diameter, nor when five or more are broken or plugged in the entire boiler.

26. *Telltale holes*.—All staybolts shorter than 8 inches applied after July 1, 1911, except flexible bolts, shall have telltale holes three-sixteenths inch in diameter and not less than $1\frac{1}{4}$ inches deep in the outer end. These holes must be kept open at all times.

27. All staybolts shorter than 8 inches, except flexible bolts and rigid bolts which are behind frames and braces, shall be drilled when the locomotive is in the shop for heavy repairs and this work must be completed prior to July 1, 1914.

STEAM GAUGES.

28. *Location of gauges*.—Every boiler shall have at least one steam gauge which will correctly indicate the working pressure. Care must be taken to locate the gauge so that it will be kept reasonably cool, and can be conveniently read by the enginemen.

29. *Siphon*.—Every gauge shall have a siphon of ample capacity to prevent steam entering the gauge. The pipe connection shall enter the boiler direct and shall be maintained steam tight between boiler and gauge. The siphon pipe and its connections to the boiler must be cleaned each time the gauge is tested.

30. *Time of testing*.—Steam gauges shall be tested at least once every three months and also when any irregularity is reported.

31. *Method of testing*.—Steam gauges shall be compared with an accurate test gauge or dead weight tester and

gauges found inaccurate shall be corrected before being put into service.

32. *Badge plates.*—A metal badge plate showing the allowed steam pressure shall be attached to the boiler head in the cab. If boiler head is lagged, the lagging and jacket shall be cut away so that the plate can be seen.

33. *Boiler number.*—The builder's number of the boiler, if known, shall be stamped on the dome. If the builder's number of the boiler can not be obtained, an assigned number which shall be used in making out specification cards shall be stamped on dome.

SAFETY VALVES.

34. *Number and capacity.*—Every boiler shall be equipped with at least two safety valves, the capacity of which shall be sufficient to prevent, under any conditions of service, an accumulation of pressure more than 5 per cent above the allowed steam pressure. .

35. *Setting of safety valves.*—Safety valves shall be set to pop at pressures not exceeding 6 pounds above the working steam pressure. When setting safety valves two steam gauges shall be used, one of which must be so located that it will be in full view of the person engaged in setting such valves; and if the pressure indicated by the gauges varies more than 3 pounds they shall be removed from the boiler, tested, and corrected before the safety valves are set. Gauges shall in all cases be tested immediately before the safety valves are set or any change made in the setting. When setting safety valves the water level in the boiler shall not be above the highest gauge cock.

36. *Time of testing.*—Safety valves shall be tested under steam at least once every three months, and also when any irregularity is reported.

WATER GLASS AND GAUGE COCKS.

37. *Number and location.*—Every boiler shall be equipped with at least one water glass and three gauge

cocks. The lowest gauge cock and the lowest reading of the water glass shall be not less than 3 inches above the highest part of the crown sheet. Locomotives which are not now equipped with water glasses shall have them applied on or before July 1, 1912.

38. *Water glass valves.*—All water glasses shall be supplied with two valves or shutoff cocks, one at the upper and one at the lower connection to the boiler, and also a drain cock, so constructed and located that they can be easily opened and closed by hand.

39. *Time of cleaning.*—The spindles of all gauge cocks and water glass cocks shall be removed and cocks thoroughly cleaned of scale and sediment at least once each month.

40. All water glasses must be blown out and gauge cocks tested before each trip and gauge cocks must be maintained in such condition that they can be easily opened and closed by hand without the aid of a wrench or other tool.

41. *Water and lubricator glass shields.*—All tubular water glasses and lubricator glasses must be equipped with a safe and suitable shield which will prevent the glass from flying in case of breakage, and such shield shall be properly maintained.

42. *Water glass lamps.*—All water glasses must be supplied with a suitable lamp properly located to enable the engineer to easily see the water in the glass.

INJECTORS.

43. Injectors must be kept in good condition, free from scale, and must be tested before each trip. Boiler checks, delivery pipes, feed water pipes, tank hose and tank valves must be kept in good condition, free from leaks and from foreign substances that would obstruct the flow of water.

FLUE PLUGS.

44. Flue plugs must be provided with a hole through the center not less than three-fourths inch in diameter. When one or more tubes are plugged at both ends the plugs must be tied together by means of a rod not less than five-eighths inch in diameter. Flue plugs must be removed and flues repaired at the first point where such repairs can properly be made.

WASHING BOILERS.

45. *Time of washing.*—All boilers shall be thoroughly washed as often as the water conditions require, but not less frequently than once each month. All boilers shall be considered as having been in continuous service between washouts unless the dates of the days that the boiler was out of service are properly certified on washout reports and the report of inspection.

46. *Plugs to be removed.*—When boilers are washed, all washout, arch, and water bar plugs must be removed.

47. *Water tubes.*—Special attention must be given the arch and water bar tubes to see that they are free from scale and sediment.

48. *Office record.*—An accurate record of all locomotive boiler washouts shall be kept in the office of the railroad company. The following information must be entered on the day that the boiler is washed:

- (a) Number of locomotive.
- (b) Date of washout.
- (c) Signature of boiler washer or inspector.
- (d) Statement that spindles of gauge cocks and water-glass cocks were removed and cocks cleaned.
- (e) Signature of the boiler inspector or the employee who removed the spindles and cleaned the cocks.

STEAM LEAKS.

49. *Leaks under lagging.*—If a serious leak develops under the lagging, an examination must be made and

the leak located. If the leak is found to be due to a crack in the shell or to any other defect which may reduce safety, the boiler must be taken out of service at once, thoroughly repaired, and reported to be in satisfactory condition before it is returned to service.

50. *Leaks in front of enginemen.*—All steam valves, cocks, and joints, studs, bolts, and seams shall be kept in such repair that they will not emit steam in front of the enginemen, so as to obscure their vision.

FILING REPORTS.

51. *Report of inspection.*—Not less than once each month and within 10 days after each inspection a report of inspection, Form No. 1, size 6 by 9 inches, shall be filed with the district inspector of locomotive boilers for each locomotive used by a railroad company, and a copy shall be filed in the office of the chief mechanical officer having charge of the locomotive.

52. A copy of the monthly inspection report, Form No. 1, or annual inspection report, Form No. 3, properly filled out, shall be placed under glass in a conspicuous place in the cab of the locomotive before the boiler inspected is put into service.

53. Not less than once each year and within 10 days after hydrostatic and other required tests have been completed a report of such tests showing general condition of the boiler and repairs made shall be submitted on Form No. 3,¹ size 6 by 9 inches, and filed with the district inspector of locomotive boilers, and a copy shall be filed in the office of the chief mechanical officer having charge of the locomotive. The monthly report will not be required for the month in which this report is filed.

¹ Form No. 3 should be printed on yellow paper.

Note.—Samples of boiler forms 1, 3, and 4 indicating exact size, color, weight, and grade of paper will be furnished on application.

54. (a) *Specification card*.—A specification card, 8 10½ inches, Form No. 4, containing the results of calculations made in determining the working pressure and other necessary data shall be filed in the office of the inspector of locomotive boilers for each locomotive. A copy shall be filed in the office of the chief mechanical officer having charge of the locomotive. Every specification card shall be verified by the oath of the engineer making the calculations, and shall be approved by the chief mechanical officer. These specification cards shall be filed as promptly as thorough examination and calculation will permit. Where accurate drawings of locomotive boilers are available, the data for specification cards, Form No. 4, may be taken from the drawings, and specification cards must be completed and filed prior to July 1, 1912. Where accurate drawings are not available, the required data must be obtained at the earliest opportunity when general repairs are made, or when flues are removed. Specification cards must be forwarded within one month after examination has been made, and all examinations must be completed. Specification cards filed prior to July 1, 1913, flues removed if necessary to enable the examination to be made before this date.

(b) When any repairs or changes are made which require the data shown on the specification card a corrected or an alteration report on an approved form, size 8 10½ inches, properly certified to, giving details of such changes shall be filed within 30 days from the date of the completion. This report should cover:

- A. Application of new barrel sheets or domes.
- B. Application of patches to barrels or domes of locomotives or to portion of wrapper sheet of crown bar boilers if not supported by staybolts.
- C. Longitudinal seam reinforcements.
- D. Changes in size or number of braces, giving maximum stress.

E. Initial application of superheaters, arch or water-bar tubes, giving number and dimensions of tubes.

F. Changes in number or capacity of safety valves.

Report of patches should be accompanied by a drawing or blue print of the patch, showing its location in regard to the center line of boiler, giving all necessary dimensions, and showing the nature and location of the defect. Patches previously applied should be reported the first time the boiler is stripped to permit an examination.

ACCIDENT REPORTS.

55. In the case of an accident resulting from failure, from any cause, of a locomotive boiler or any of its appurtenances, resulting in serious injury or death to one or more persons, the carrier owning or operating such locomotive shall immediately transmit by wire to the chief inspector of locomotive boilers, at his office in Washington, D. C., a report of such accident, stating the nature of the accident, the place at which it occurred, as well as where the locomotive may be inspected, which wire shall be immediately confirmed by mail, giving a full detailed report of such accident, stating, so far as may be known, the causes and giving a complete list of the killed or injured.

ORDER.

At a General Session of the INTERSTATE COMMERCE COMMISSION, held at its office in Washington, D. C., on the 11th day of October, A. D. 1915.

IN THE MATTER OF RULES AND INSTRUCTIONS FOR THE INSPECTION AND TESTING OF STEAM LOCOMOTIVES AND TENDERS IN ACCORDANCE WITH ACT OF FEBRUARY 17, 1911, AMENDED MARCH 4, 1915.

Whereas the act of March 4, 1915 (Public—No. 318, Sixty-third Congress), amending the act of February 17, 1911, making said act apply to and include the entire locomotive and tender and all their parts, requires, among other things, that each carrier subject to this act shall file its rules and instructions for the inspection of locomotives and tenders with the chief inspector within three months after the approval of the act, and after hearing and approval by the Interstate Commerce Commission such rules and instructions, with such modifications as the Commission requires, shall become obligatory upon such carrier: *Provided, however,* That if any carrier subject to this act shall fail to file its rules and instructions the chief inspector shall prepare rules and instructions not inconsistent therewith for the inspection of locomotives and tenders, to be observed by such carrier, which rules and instructions being approved by the Interstate Commerce Commission and a copy thereof being served on the president, general manager, or general superintendent of such carrier shall be obligatory, and a violation thereof punished as provided in said act; and

Whereas at the expiration of the period of three months after the approval of said act, the carriers having filed a code of rules prepared by their committee as a basis for discussion only, and having expressed a desire through their committee that the chief inspector prepare a suitable code of rules for the inspection of locomotives and tenders; and

Whereas the chief inspector thereupon, in accordance with the law and with the expressed desire of the carriers, proceeded to prepare for submission to the Interstate Commerce Commission for approval rules and instructions for the inspection of locomotives and tenders and all their parts; and

Whereas upon due notice there came on a hearing before the Interstate Commerce Commission on September 28 to October 2, 1915, inclusive, in the matter of approval and establishment of the rules and instructions prepared by the said chief inspector; and

Whereas at the hearing aforesaid the rules and instructions prepared by the chief inspector were submitted to the Commission for approval, and all parties appearing at said hearing were fully heard in respect to the matters involved; and

Whereas all of the rules prepared by the chief inspector having been agreed to by representatives of the railroad employees, and all except rules numbered 18, 29, and 31 having been agreed to by representatives of the carriers; and

Whereas it appearing that the interests of all may be best served by the immediate promulgation of the rules which have been agreed to, thus avoiding the delay incident to the consideration of evidence and briefs with respect to the said rules numbered 18, 29, and 31, which will be acted on later, the said rules and instructions having been fully considered by the Commission:

It is ordered, That the said rules and instructions for the inspection of locomotives and tenders and all their parts,

as follows, be, and the same are hereby, approved, and from and after the 1st day of January, 1916, shall be observed by each and every common carrier subject to the provisions of the act of Congress aforesaid as the minimum requirements: *Provided*, That nothing herein contained shall be construed as prohibiting any carrier from enforcing additional rules and instructions not inconsistent with the foregoing, tending to a greater degree of precaution against accidents.

It is further ordered, That changes required by paragraph 2 of rule 16, the first sentence of rule 17, paragraph 2 of rule 22, paragraph 2 of rule 43, the first sentence of rule 47, paragraph 1 of rule 50, rule 51, and paragraph 3 of rule 52 shall be made the first time locomotives are shopped for general or heavy repairs, but must be completed before January 1, 1917.

By the Commission.

[SEAL.]

GEORGE B. MCGINTY,

Secretary.

ORDER.

At a General Session of the INTERSTATE COMMERCE COMMISSION, held at its office in Washington, D. C., on the 6th day of June, A. D. 1916.

IN THE MATTER OF RULES AND INSTRUCTIONS FOR THE INSPECTION AND TESTING OF STEAM LOCOMOTIVES AND TENDERS IN ACCORDANCE WITH ACT OF FEBRUARY 17, 1911, AMENDED MARCH 4, 1915.

The matter of rules and instructions for the testing of steam locomotive boilers and their appurtenances being under consideration; and the matters and things involved having been duly heard and submitted by the parties, and full investigation having been had by the Commission,

It is ordered, That the rules and instructions prescribed by the Commission's order of October 11, 1915, be, and the same are hereby, amended by the addition of the following rules:

29. *Locomotives used in road service.*—Each locomotive used in road service between sunset and sunrise shall have a headlight which will enable persons with normal vision in the cab of the locomotive, under normal weather conditions, to see a dark object the size of a man for a distance of 1,000 feet or more ahead of the locomotive; and such headlights must be maintained in good condition.

Locomotives used in road service, which are regularly required to run backward for any portion of their trip, except to pick up a detached portion of their train, or in making terminal movements, shall have on the rear a headlight which will meet the foregoing requirements.

Nothing in the foregoing rules shall prevent the use of a device whereby the light may be diminished in yards and at stations to an extent that will enable the person or persons operating the locomotive to see a dark object the size of a man for a distance of 300 feet or more ahead of the locomotive under the same conditions as set forth above.

When two or more locomotives are used in the same train, the locomotive only, will be required to display a headlight.

31. *Locomotives used in yard service.*—Each locomotive used in service between sunset and sunrise shall have two headlights, one on the front of the locomotive and one on the rear, each of which shall enable persons with normal vision, in the cab of the locomotive, under normal weather conditions, to see a dark object the size of a ball at a distance of 300 feet or more; and such headlights must be maintained in good condition.

It is further ordered, That said rules 29 and 31 be, and are hereby, made applicable to all new steam locomotives put in service subsequent to October 1, 1916, and that all steam locomotives given general overhauling subsequent to October 1, 1916, and that all steam locomotives to the rules be equipped in conformity therewith later than January 1, 1920.

By the Commission:

[SEAL.]

GEORGE B. MCGINTY

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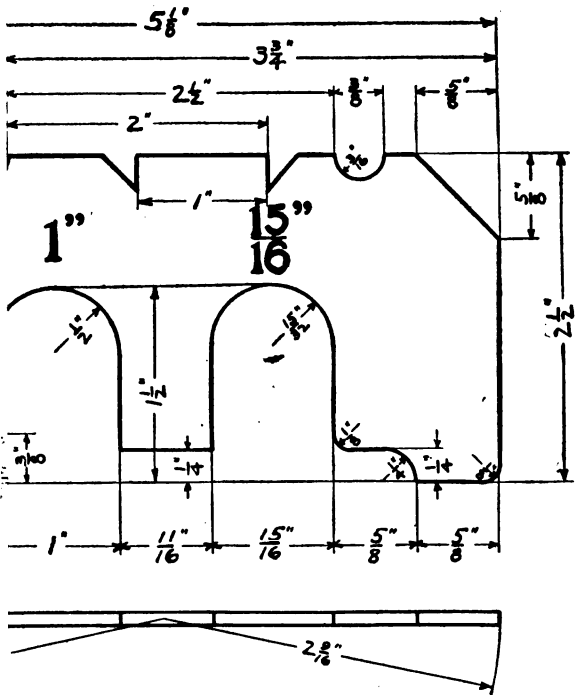


FIG. 8.—WHEEL DEFECT GAUGE.

mining flat spots, worn flanges, and broken rims. (See Rules 45, 46, and 50.)

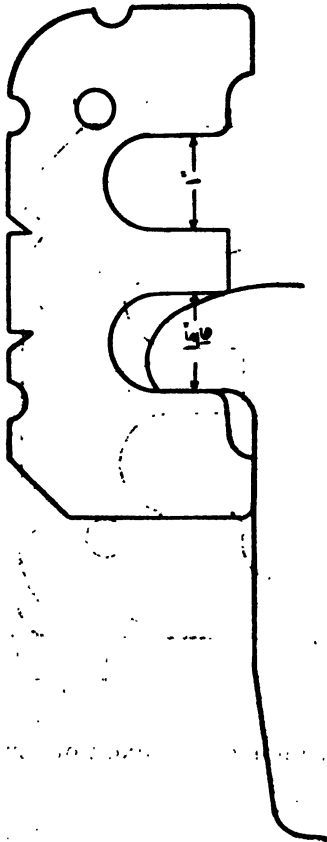


FIG. 9.—METHOD OF GAUGING WORN FLANGES.

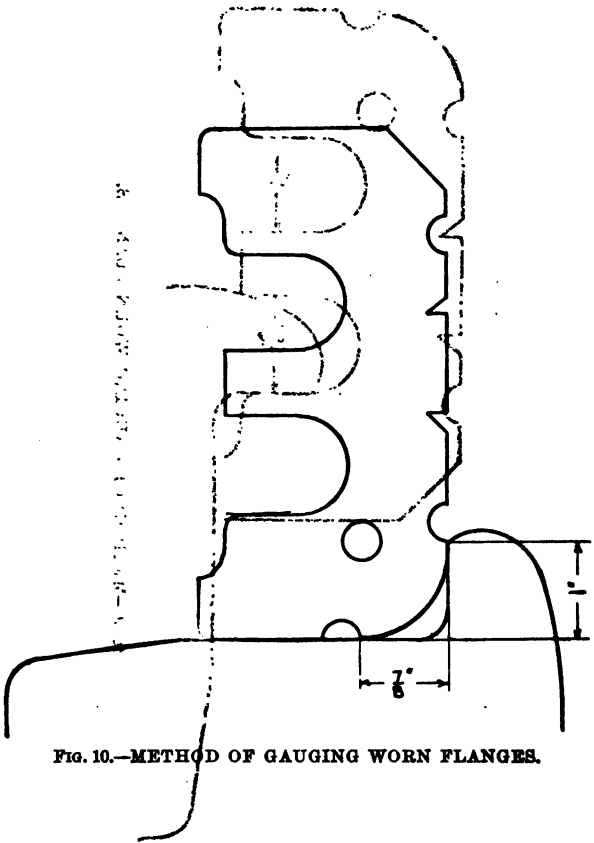


FIG. 10.—METHOD OF GAUGING WORN FLANGES.

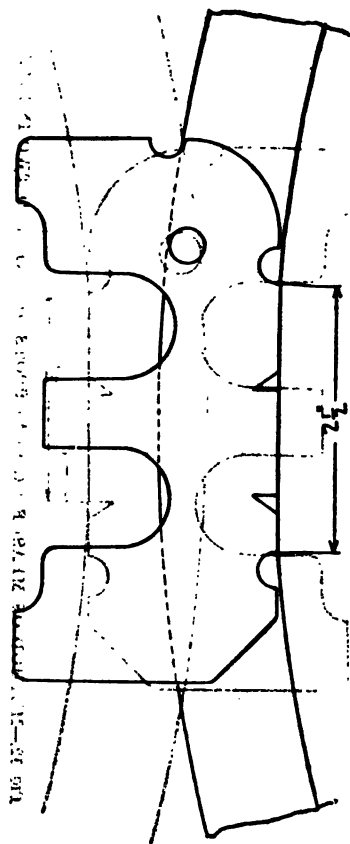


FIG. 11.—METHOD OF GAUGING SHELLS AND FLAT SPOTS.

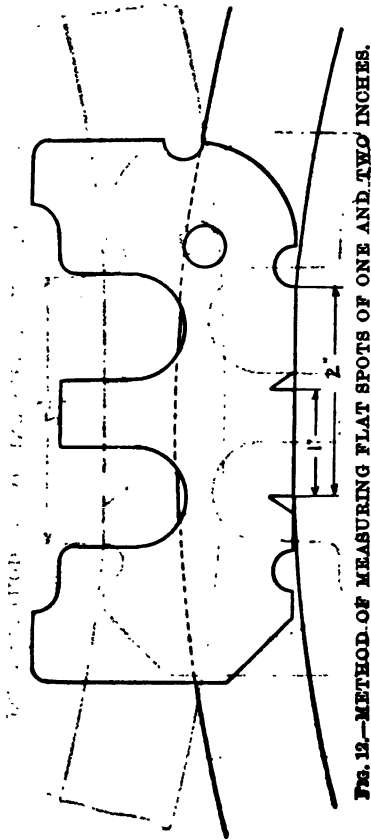


FIG. 12.—METHOD OF MEASURING FLAT SPOTS OF ONE AND TWO INCHES.

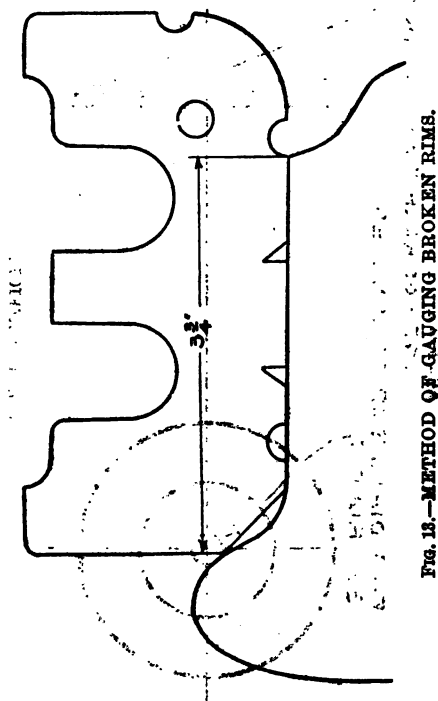


FIG. 13.—METHOD OF GAUGING BROKEN RIMS.

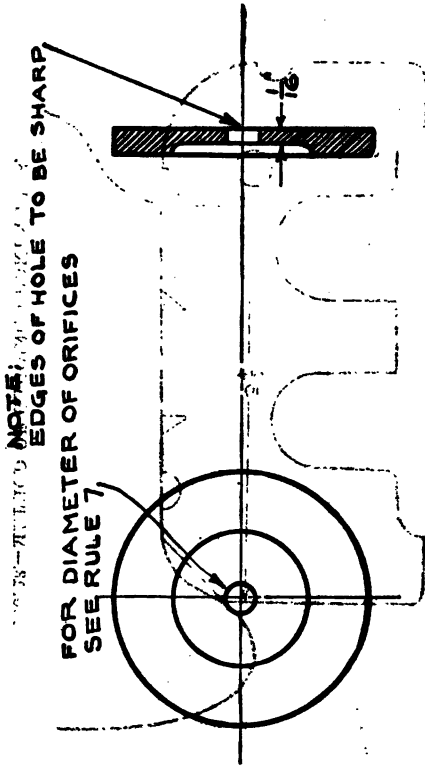


FIG. 14.—ORIFICE.

**SAFETY APPLIANCE STANDARDS FOR LOCOMOTIVES, AS
FIXED BY ORDER OF THE COMMISSION
DATED MARCH 13, 1911.**

STEAM LOCOMOTIVES USED IN ROAD SERVICE.

TENDER SILL-STEPS.

Number:

Four (4) on tender.

Dimensions:

Bottom tread not less than eight (8) by twelve (12) inches, metal.

[May have wooden treads.]

If stirrup-steps are used, clear length of tread shall be not less than ten (10), preferably twelve (12), inches.

Location:

One (1) near each corner of tender on sides.

Manner of application:

Tender sill-steps shall be securely fastened with bolts or rivets.

PILOT SILL-STEPS.

Number:

Two (2).

Dimensions:

Tread not less than eight (8) inches in width by ten (10) inches in length, metal.

[May have wooden treads.]

Location:

One (1) on or near each end of buffer-beam outside of rail and not more than sixteen (16) inches above rail.

Manner of application:

Pilot sill-steps shall be securely fastened with bolts or rivets.

PILOT-BEAM HANDHOLDS.

Number:

Two (2).

*Dimensions:*Minimum diameter, five-eighths ($\frac{5}{8}$) of an inch, wrought iron or steel.

Minimum clear length, fourteen (14), preferably sixteen (16), inches.

Minimum clearance, two and one-half ($2\frac{1}{2}$) inches.*Location:*

One (1) on each end of buffer-beam.

[If uncoupling-lever extends across front end of locomotive to within eight (8) inches of end of buffer-beam, and is seven-eighths ($\frac{7}{8}$) of an inch or more in diameter, securely fastened, with a clearance of two and one-half ($2\frac{1}{2}$) inches, it is a handhold.]

Manner of application:

Pilot-beam handholds shall be securely fastened with bolts or rivets.

SIDE-HANDHOLDS.

Number:

Six (6).

*Dimensions:*Minimum diameter, if horizontal, five-eighths ($\frac{5}{8}$) of an inch; if vertical, seven-eighths ($\frac{7}{8}$) of an inch, wrought iron or steel.

Horizontal, minimum clear length, sixteen (16) inches.

Vertical, clear length equal to approximate height of tank.

Minimum clearance two (2), preferably two and one-half ($2\frac{1}{2}$), inches.*Location:*

Horizontal or vertical: If vertical, one (1) on each side of tender within six (6) inches of rear or on corner, if horizontal, same as specified for "Box and other house cars."

One (1) on each side of tender near gangway; one (1) on each side of locomotive at gangway; applied vertically.

Manner of application:

Side-handholds shall be securely fastened with not less than one-half ($\frac{1}{2}$) inch bolts or rivets.

REAR-END HANDHOLDS.***Number:***

Two (2).

Dimensions:

Minimum diameter, five-eighths ($\frac{5}{8}$) of an inch, wrought iron or steel.

Minimum clear length, fourteen (14) inches.

Minimum clearance two (2), preferably two and one-half ($2\frac{1}{2}$), inches.

Location:

Horizontal: One (1) near each side of rear end of tender on face of end-sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of tender.

Manner of application:

Rear-end handholds shall be securely fastened with not less than one-half ($\frac{1}{2}$) inch bolts or rivets.

UNCOUPLING-LEVERS.***Number:***

Two (2) double levers, operative from either side.

Dimensions:

Rear-end levers shall extend across end of tender with handles not more than twelve (12), preferably nine (9), inches from side of tender with a guard bent on handle to give not less than two (2) inches clearance around handle.

Location:

One (1) on rear end of tender and one (1) on front end of locomotive. Handles of front-end levers shall be not more than twelve (12), preferably nine (9), inches from ends of buffer-beam, and shall be so constructed as to give a minimum clearance of two (2) inches around handle.

Manner of application:

Uncoupling levers shall be securely fastened with bolts or rivets.

COUPLERS.

Locomotives shall be equipped with automatic couplers at rear of tender and front of locomotive.

STEAM LOCOMOTIVES USED IN SWITCHING SERVICE.**FOOTBOARDS.****Number:**

Two (2) or more.

Dimensions:

Minimum width of tread, ten (10) inches, wood.

Minimum thickness of tread, one and one-half (1½), preferably two (2), inches.

Minimum height of back-stop, four (4) inches above tread.

Height from top of rail to top of tread, not more than twelve (12) nor less than nine (9) inches.

Location:

Ends or sides.

If on ends, they shall extend not less than eighteen (18) inches outside of gauge of straight track, and shall be not more than twelve (12) inches shorter than buffer-beam at each end.

Manner of application:

End footboards may be constructed in two (2) sections, provided that practically all space on each side of coupler is filled; each section shall be not less than three (3) feet in length.

Footboards shall be securely bolted to two (2) one (1) by four (4) inches metal brackets, provided footboard is not cut or notched at any point.

Manner of application—Continued.

If footboard is cut or notched or in two (2) sections, not less than four (4) one (1) by three (3) inches metal brackets shall be used, two (2) located on each side of coupler. Each bracket shall be securely bolted to buffer-beam, end-sill or tank-frame by not less than two (2) seven-eighths ($\frac{7}{8}$) inch bolts.

If side footboards are used, a substantial handhold or rail shall be applied not less than thirty (30) inches nor more than sixty (60) inches above tread of footboard.

SILL-STEPS.

Number:

Two (2) or more.

Dimensions:

Lower tread of step shall be not less than eight (8) by twelve (12) inches, metal.

[May have wooden treads.]

If stirrup-steps are used, clear length of tread shall be not less than ten (10), preferably twelve (12), inches.

Location:

One (1) or more on each side at gangway secured to locomotive or tender.

Manner of application:

Sill-steps shall be securely fastened with bolts or rivets.

END-HANDHOLDS.

Number:

Two (2).

Dimensions:

Minimum diameter, one (1) inch, wrought iron or steel.

Minimum clearance, four (4) inches, except at coupler casting or braces, when minimum clearance shall be two (2) inches.

Location:

One (1) on pilot buffer-beam; one on rear end of tender, extending across front end of locomotive and rear end of tender. Ends of handholds shall be not more than (6) inches from ends of buffer-beam or end-sill, securely fastened at ends.

Manner of application:

End-handholds shall be securely fastened with bolts or rivets.

SIDE-HANDHOLDS.*Number:*

Four (4).

Dimensions:

Minimum diameter, seven-eighths ($\frac{7}{8}$) of an inch, wrought iron or steel.

Clear length equal to approximate height of tank.

Minimum clearance, two (2); preferably two and one-half ($2\frac{1}{2}$), inches.

Location:

Vertical. One (1) on each side of tender near front corner; one (1) on each side of locomotive at gang-way.

Manner of application:

Side-handholds shall be securely fastened with bolts or rivets.

UNCOUPLING-LEVERS.*Number:*

Two (2) double levers, operative from either side.

Dimensions:

Handles of front-end levers shall be not more than twelve (12), preferably nine (9), inches from ends of buffer-beam, and shall be so constructed as to give a minimum clearance of two (2) inches around handle.

Rear end levers shall extend across end of tender with handles not more than twelve (12), preferably nine (9), inches from side of tender, with a guard bent on handle to give not less than two (2) inches clearance around handle.

Location:

One (1) on rear end of tender and one (1) on front end of locomotive.

HANDRAILS AND STEPS FOR HEADLIGHTS.

Switching locomotives with sloping tenders with man-hole or headlight located on sloping portion of tender shall be equipped with secure steps and handrail or with platform and handrail leading to such man-hole or headlight.

END-LADDER CLEARANCE.

No part of locomotive or tender *except* draft rigging, coupler and attachments, safety-chains, buffer-block, foot-board, brake pipe, signal pipe, steam-heat pipe or arms of uncoupling lever shall extend to within fourteen (14) inches of a vertical plane passing through the inside face of knuckle when closed with horn of coupler against buffer block or end sill.

COUPLERS.

Locomotives shall be equipped with automatic couplers at rear of tender and front of locomotives.

SPECIFICATIONS COMMON TO ALL STEAM LOCOMOTIVES.**HAND-BRAKES.**

Hand brakes will not be required on locomotives nor on tenders when attached to locomotives.

If tenders are detached from locomotives and used in special service, they shall be equipped with efficient hand-brakes.

RUNNING-BOARDS.**Number:**

Two (2).

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Dimensions:

Not less than ten (10) inches wide. If of wood, not less than one and one-half ($1\frac{1}{2}$) inches in thickness; if of metal, not less than three-sixteenths ($\frac{3}{16}$) of an inch, properly supported.

Location:

One (1) on each side of boiler extending from cab to front end near pilot-beam.

[Running boards may be in sections. Flat top steam-chests may form section of running board.]

Manner of application:

Running boards shall be securely fastened with bolts, rivets or studs.

Locomotives having Wootten type boilers with cab located on top of boiler more than twelve (12) inches forward from boiler head shall have suitable running-boards running from cab to rear of locomotive, with handrailings not less than twenty (20) nor more than forty-eight (48) inches above outside edge of running boards, securely fastened with bolts, rivets or studs.

HANDRAILS.**Number:**

Two (2) or more.

Dimensions:

Not less than one (1) inch in diameter, wrought iron or steel.

Location:

One on each side of boiler extending from near cab to near front end of boiler, and extending across front end of boiler, not less than twenty-four (24) nor more than sixty-six (66) inches above running-board.

Manner of application:

Handrails shall be securely fastened to boiler.

TENDERS OF VANDERBILT TYPE.

Tenders known as the Vanderbilt type shall be equipped with running boards; one (1) on each side of tender not less than ten (10) inches in width and one on top of tender not less than forty-eight (48) inches in width, extending from coal space to rear of tender.

There shall be a handrail on each side of top running board, extending from coal space to rear of tank, not less than one (1) inch in diameter and not less than twenty (20) inches in height above running board from coal space to manhole.

There shall be a handrail extending from coal space to within twelve (12) inches of rear of tank, attached to each side of tank above side running board, not less than thirty (30) nor more than sixty-six (66) inches above running board.

There shall be one (1) vertical end handhold on each side of Vanderbilt type of tender, located within eight (8) inches of rear of tank extending from within eight (8) inches of top of end-sill to within eight (8) inches of side handrail. Post supporting rear end of side running board if not more than two (2) inches in diameter and properly located, may form section of handhold.

An additional horizontal end handhold shall be applied on rear end of all Vanderbilt type of tenders which are not equipped with vestibules. Handhold to be located not less than thirty (30) nor more than sixty-six (66) inches above top of end-sill. Clear length of handhold to be not less than forty-eight (48) inches.

Ladders shall be applied at forward ends of side running boards.

HANDRAILS AND STEPS FOR HEADLIGHTS.

Locomotives having headlights which can not be safely and conveniently reached from pilot beam or steam chests shall be equipped with secure handrails and steps suitable for the use of men in getting to and from such headlights.

A suitable metal end or side ladder shall be applied to all tanks more than forty-eight (48) inches in height, measured from the top of end-sill, and securely fastened with bolts or rivets.

COUPLERS.

Locomotives shall be equipped with automatic coupler at rear of tender and front of locomotive.

NOTE.—Prescribed standard height of drawbars: Standard gauge railroads—maximum 34½, minimum 31½ inches; narrow gauge railroads—maximum 26, minimum 23 inches; 2-foot gauge railroads—maximum 17½, minimum 14½ inches.

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